**Lesson Five: “***Performing Scientific Notation Operations”*

**Important Vocabulary**

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Magnitude: The relative size of an object

More Than & Less Than:

* A number is *less than* a given number if it lies to the *left* of that number on the number line.
* Number line from -10 to 10. From left to right: -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10A number is *greater/more than* a given number if it lies to the *right* of that number on the number line.

**Value Comparison:** How Many Time Larger/Smaller is One Value Compared with Another

**GOAL**: Compare numbers expressed in the form of a single digit times an integer power of 10 and

determine how many times larger one is than the other.

1. Before addressing the numbers expressed in scientific notation, provide examples comparing how many times larger a whole number is compare to another

Examples: 10 vs. 2 10 is 5 times larger than 1.

3 vs. 9 9 is 3 times larger than 3.

We determine how many times larger one number compared to another, by *dividing* the larger number by the smaller number.

1. Now let’s compare values expressed as powers of 10.

Examples:

1. 103 vs. 101 = 1,000 vs. 10

1000 is 100 times larger than 10

So…. 103 is 100 (102) times larger than 10

1. 10-4 vs. 10-8 = .0001 vs. .00000001

.0001 is 10,000 times larger than .00000001

So…. 10-4 is 10,000 (104) times larger than 10-8

From both of these examples, we can see then pattern of simply subtracting the exponents, rather than rewriting in standard notation and dividing.

1. Now we put the last two concepts together:

Example:

Since we are dividing to see how much larger one is versus the other we can rewrite the problem as:

(8 x 103) ÷ (2 x 10)

1. 8 x 103 vs. 2 x 10

We can then rewrite (8 x 103) ÷ (2 x 10) as a fraction:

We then separate the problems into 2 fractions (unit number and power terms):

=

Then we simplify: = 4 x = 4 x 100 = 400

So 8 x 103 is 400 times larger than 2 x 10

1. 2 x 104 vs. 4 x 102

= = .5 x = .5 x 100 = 50

So 2 x 104 is 50 times larger than 4 x 102

**TEACHER NOTE**: For this example, it would be beneficial to also show how we can use our properties of exponents (“shortcut” ) to solve these problems.

Ex: 2 x 104 is .5 x 102 larger than 4 x 102. And .5 x 102 is 50 in standard form.

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**Relay Game/Activity**

Room Arrangement:

Resources:

* Whiteboard Markers
* Flashcards with problems on back
* Masking Tape

Divide the classroom in two, using a single row of student’s desk/chairs.

Groupings:

Split the class into two relay groups

Instructions:

1. Arrange the teams on either side of the dividing line. Students need to line up, one behind the other, with the leading person facing the whiteboard. Teams should be waiting a few feet away from the white board (use tape to mark the line students must stay behind). MAKE SURE THE SPACE BETWEEN THE BOARD AND THE LINE IS CLEAR!
2. Divide the flashcard problems into two sets. Place half on the flashcards on the board for the first team, and the other set on the side of the board accessible by the second team.
3. Student Instructions:
   * Sit down in your rows facing the whiteboard
   * Your task is to solve the problems written on the flashcard as a team
   * Students will (safely) race to the board, one by one, but will only complete one step needed to solve the problem.
   * Once a student has solved one line/step of the given problem, they must race back with the marker (acting as a relay baton) so their teammate can do the next line.
   * Students who have just returned must seat at the back of the line.
   * This process will continue until each problem is complete.
   * You cannot move on to the next problem until the teacher confirms the solution is correct.
   * The student who reads the flashcard is only required to write the problem on the board, then pass the marker to the next member of their team to complete the first step.
   * You may call out advice to your teammates, but only if they ask for your help.
   * The winning team is whoever successfully completes their set of problems first.
   * NO CALCULATORS (unless instructed otherwise)

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